DOCUMENT RESUME

ED 405 805 IR 017 836

TITLE	North Carolina Computer Skills Curriculum Lesson Plans, 6-8: Spreadsheets.
INSTITUTION	North Carolina State Dept. of Public Instruction, Raleigh.
PUB DATE	95
NOTE	48p.
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Access to Information; Class Activities; *Computer Literacy; Definitions; Educational Objectives; Information Technology; Instructional Materials; Instructional Program Divisions; Intermediate Grades; Junior High Schools; Learning Activities; Lesson Plans; Public Schools; Skills; *Spreadsheets; State Curriculum Guides
IDENTIFIERS	Computer Use; *North Carolina

ABSTRACT

This computer skills curriculum guide contains activities for the public schools of North Carolina; these lesson plans are designed specifically for grades 6-8 and focus on spreadsheets. Lesson plans for each grade include a list of materials needed, lesson time, teacher preparation activities, outline of activities, and instructional measure. For each lesson, communication, computer and information skills objectives addressed are outlined as well as science, social studies or mathematics skills. Worksheets with various sample spreadsheets and spreadsheet exercises are also included. (AEF)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

IR

ED 405 805

Spreadsheets

Computer Skills Curriculum

Terms

Spreadsheet
Column
Row
Cell
Value
Label
Formula

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

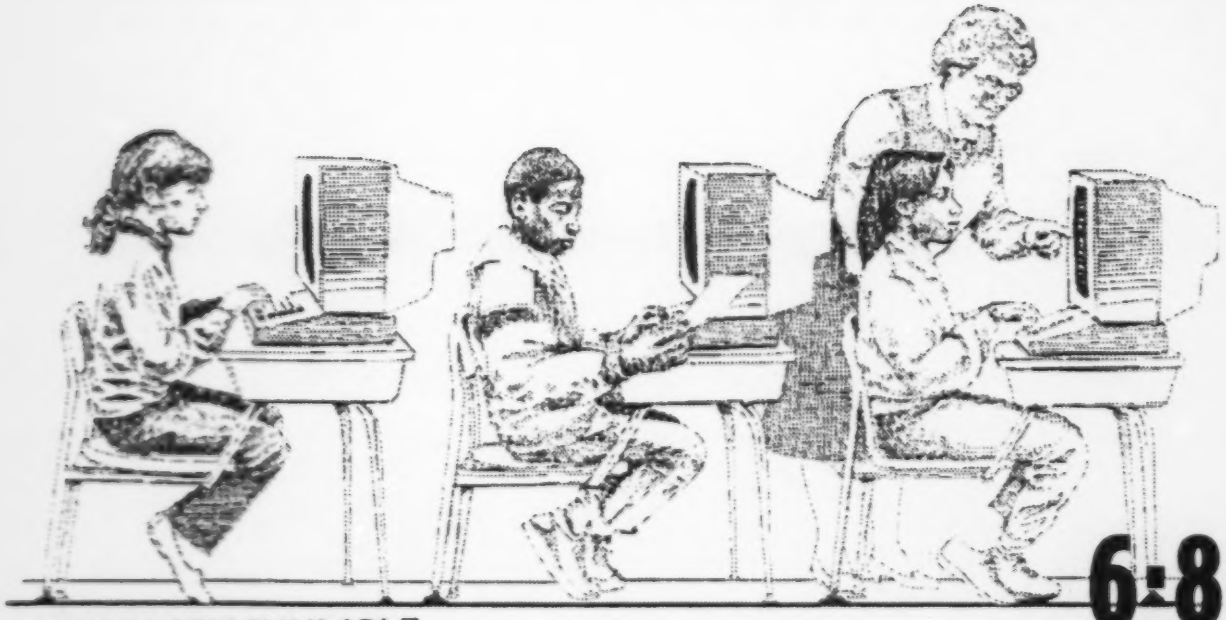
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

E. Brumback

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."



IR017836

6-8

BEST COPY AVAILABLE

INSTRUCTIONAL TECHNOLOGIES DIVISION
PUBLIC SCHOOLS OF NORTH CAROLINA
301 NORTH WILMINGTON STREET
RALEIGH, NC 27601-2825
FAX #: 919-733-4763

TITLE: NC Computer Skills Curriculum Lesson Plans

BY: Instructional Technology (formerly Computer Services Section)
Public Schools of North Carolina

DATE: 1994-1995

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

6

Title: Baseball Line-up
Grade: 6
Competency 2.2: Identify the difference between paper spreadsheets (e.g., gradebook, budget, sports statistics) and computer spreadsheets.
Measure 2.2.1: Given a table of baseball statistics, describe the advantages of having the statistics on a computer spreadsheet.

Materials Needed: Transparency of black line master **Gradebook**; transparency of black line master **Batting Statistics**; computer with the prepared spreadsheet file *GradBK2* ; (optional) LCD palette; overhead projector.

Time: Two class sessions.

Activities

Pre-Activities:
With the students

1. Project a transparency of the **Gradebook** black line master for the class to see. Ask the prompting questions below to get your students to start thinking about the difference between paper spreadsheets and computer spreadsheets:

   "Raise you hand if you know how I (the teacher) calculate average grades ."

   "Would you like to be able to know your new average grade after each new test or homework grade is entered in the gradebook? "

   "Explain what I (the teacher) would have to do in order to calculate new average grades after each new grade is entered in the gradebook."

   "How much time do you think it would take for me to compute new average grades for a class of 30 students or for all of my classes."

   "Would anyone like to figure out how long it would take?"

   "Imagine if this gradebook could automatically compute the averages for each student each time that a new grade is entered and display the new average grade in the far right column. What would be some advantages of having an automatically calculating gradebook? How might you as students use one for your personal grades?

2. Explain to the class that this is the way that computer spreadsheets work. They enable you to organize information into columns and rows and to have the computer automatically make computations on the information in the spreadsheet each time the information is changed.
3. On the **Gradebook** transparency, add another grade for one of the three students. Instruct the class to average the grades for that student and record the time it took them. Enter their findings in the Average Grade column and announce how long it took for them to do the calculations.
4. Repeat the process using a computer spreadsheet by demonstrating file *GradBK2*. You can use an LCD palette and overhead projector to project the spreadsheet for the entire class to see or have small groups of students come to the computer to view the demonstration. This spreadsheet will allow you to enter a student's name and

TERMS
Spreadsheet
Columns
Rows

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.2 The learner will analyze, synthesize, and organize information and discover related ideas, concepts, or generalizations.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 6)

1.2 Use models and pictures to demonstrate ratios, proportions and percents; explain relationships.

1.6 Explore relationships among whole numbers, fractions, decimals, and percents using money, concrete models, or a calculator.

5.4 Select an appropriate method for solving problems including estimation, observation, formulas, mental math, paper and pencil calculation, calculator and computers.

5.5 Make conjectures and arguments and identify various points of view.

6.3 Display data using computer software and explore the use of spreadsheets.

6.6 Interpret a statistical statement and discuss the extent to which the results of a sample can be generalized.

SPREADSHEETS

BEST COPY AVAILABLE

Computer Skills: (Gr. 6)

2.2 Identify the difference between paper spreadsheets (e.g., gradebook, budget, sports statistics) and computer spreadsheets.

Notes:

then add grades with the average being re-calculated with the edition or changing of each grade. Ask the class if anyone can explain what happens to the average each time you add or change a grade.

Activity:

1. Project a transparency of black line master **Batting Statistics** for the class to see and explain each of the columns of data.

Player ..... The name of several players on the Atlanta Braves team.
At Bat ..... The number of times each player came to bat.
Hits ..... The number of hits by each player that resulted in getting on base.
Batting Average ..... The portion of times *At Bat* that each player earned a *Hit*. A *Batting Average* of .500 would mean that the player earned a hit half of the times that he came to bat.

Atlanta Braves

Player	At Bat	Hits	Batting Average
Pendleton	640	199	.311
Sanders	305	92	.304
Nixon	456	134	.264
Blauser	363	90	.262
Bream	372	97	.261
Gant	544	141	.259
Justice	484	124	.256
L. Smith	198	50	.247
Hunter	238	57	.239
Olson	302	72	.238
Berryhill	307	70	.228
Lemke	429	97	.227
Ballard	285	60	.211

2. Ask your students how batting averages are computed. Answer: The *Batting Average* is computed by dividing the number of *Hits* by the number of times *At Bat* (use transparency, **Batting Statistics**). The value is usually calculated three places to the right of the decimal and reported as a whole number. An answer of .32 would be reported as *320*.
3. Divide the class into groups of four students. Ask each group to come up with as many advantages as possible for having this table of baseball statistics on a computer spreadsheet. Remind them that the computer spreadsheet would be able to re-calculate *Batting Averages* each time that the number of times *At Bat* and the number of *Hits* is changed.

Measure

Have each student write a letter to the school baseball coach describing the benefits of keeping game statistics on a computer spreadsheet.

Gradebook

Name	Grades 1	2	3	4	5	6	7	8	9	10	Average Grade
Adams, Jane	79	84	92	76	95	91					
Crabtree, Ben	76	89	93	96	98	91					
Drake, Doug	82	85	86	97	98	89					

Batting Statistics

Atlanta Braves

Player	At Bat	Hits	Batting Average
Pendleton	640	199	311
Sanders	303	92	304
Nixon	456	134	264
Blauser	343	90	262
Bream	372	97	261
Gant	544	141	259
Justice	484	124	256
L Smith	158	39	247
Hunter	238	57	239
Olson	302	72	238
Berryhill	307	70	228
Lemke	427	97	227
Belliard	285	60	211

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

6

Title: Nutrient Counting
Grade: 6
Competency 2.2: Identify the difference between paper spreadsheets (e.g., gradebook, budget, sports statistics) and computer spreadsheets.
Measure 2.2.2: Given a table of the nutritional content of specific food items, discuss how it might be used if it were on a computer.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.2 The learner will analyze, synthesize, and organize information and discover related ideas, concepts, or generalizations.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 6)

5.2 Analyze problem situations and apply appropriate strategies for solving them.

5.3 Use inductive and deductive reasoning to solve problems.

5.4 Select an appropriate method for solving problems including estimation, observation, formulas, mental math, paper and pencil calculations, calculator and computers.

5.5 Make conjectures and arguments and identify various points of view.

6.3 Display data using computer software and explore the use of spreadsheets.

7.2 Select appropriate strategies, solve a variety of application problems, and justify the selection.

Healthful Living: (Gr. 6)

5.2 Select menus containing foods high in vitamin A, iron, and vitamin C.

Materials Needed: A newspaper, novel, baseball scores, cooking recipe, picture, brochure, phone bill, set of instructions, and gradebook; transparency of the **Nutrient Counting Illustration** black line master; overhead projector; computer with a prepared spreadsheet file loaded (file -- *Nutrient*).

Time: One or two class sessions.

TERMS
Spreadsheet
Columns
Rows

Activities

Pre-Activities:

1. Show the class some examples of print information; e.g., a column of text from the newspaper, a novel, baseball scores, cooking recipe, picture, brochure, phone bill, set of instructions, gradebook. Include a table of information from a science textbook (nutritional data, statistics about the planets, data on motion, etc.). Ask the students to identify the examples that display information as a table with columns and rows.
2. Describe the examples that display information as a table of columns and rows as paper spreadsheets.
3. Ask the students to suggest the types of calculations that might be involved in each of the paper spreadsheets.
4. List the paper spreadsheet with the suggested calculations on the board.
5. Discuss whether a computer could do the calculations faster or more accurately than people could.

Activity

1. Project a transparency of the **Nutrient Counting Illustration** black line master for the class to see.

2. Describe each of the columns:
   Item
   A food item being evaluated in terms of nutritional value.
   Qty.
   The quantity of each food item being evaluated.
   Protein, Vitamin C, ...
   The amount of each nutrient contained in the entered item of food.

Nutrient (SS)

	A	B	C	D	E	F	G	H
1								
2	Item		Qty.		Protein	Vitamin C	Calcium	Iron
3			Servings		(grams)	(mg)	(mg)	(mg)
4								
5	Chicken Drumstick		0		0	0	0	0
6	Hamburger Patty		1		20	0	9	2.1
7	Fresh Spinach		1		2	15	54	1.5
8	Baked Potato		0		0	0	0	0
9	Fresh Corn		1		3	5	2	0.5
10	Cooked Fresh Carrots		1		2	4	48	1
11	Raw Cabbage		0		0	0	0	0
12	Banana		1		1	10	7	0.4
13	Apple		0		0	0	0	0
14								
15			Total Nutrients		28	34	120	5.5
16								

3. Explain that a spreadsheet file of this information will calculate and display the amount of each nutrient delivered by the quantity of each food item. It will also calculate and display the total amount of nutrients.

SPREADSHEETS

BEST COPY AVAILABLE

Computer Skills: (Gr. 6)

2.2 Identify the difference between paper spreadsheets (e.g., gradebook, budget, sports statistics) and computer spreadsheets..

Notes:

4. Load the file *Nutrient* and demonstrate this application. Enter amounts of each food item in ounces and observe the vitamins delivered. Change the amounts and observe how the amounts of vitamins change.

5. Divide the class into groups of four students and ask each group to describe at least three types of people who might use this spreadsheet and how they might use it.

6. Ask a member of each group to report their findings.

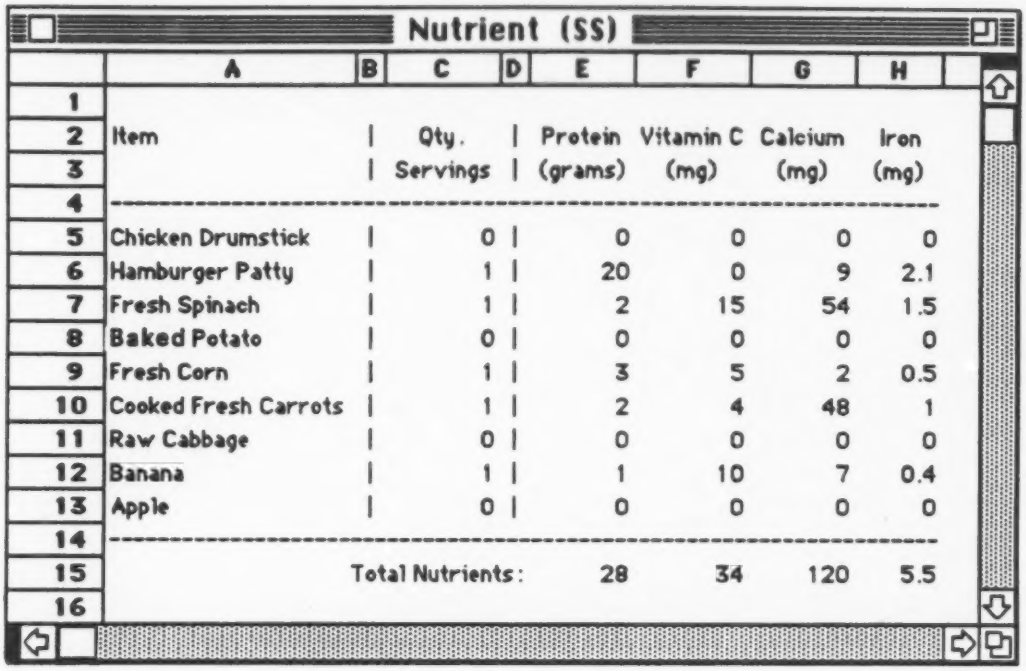
Extension:

1. Ask each class member to write a letter to one of the people that they identified explaining how they might use this computer spreadsheet.

Measure

Given a grocery store checkout slip, have each student describe the difference between the paper slip and a computer version of a grocery store receipt.

Nutrient Counting Illustration



Nutrient (SS)

	A	B	C	D	E	F	G	H
1								
2	Item	|	Qty.	|	Protein	Vitamin C	Calcium	Iron
3		|	Servings	|	(grams)	(mg)	(mg)	(mg)
4	----------							
5	Chicken Drumstick	|	0	|	0	0	0	0
6	Hamburger Patty	|	1	|	20	0	9	2.1
7	Fresh Spinach	|	1	|	2	15	54	1.5
8	Baked Potato	|	0	|	0	0	0	0
9	Fresh Corn	|	1	|	3	5	2	0.5
10	Cooked Fresh Carrots	|	1	|	2	4	48	1
11	Raw Cabbage	|	0	|	0	0	0	0
12	Banana	|	1	|	1	10	7	0.4
13	Apple	|	0	|	0	0	0	0
14	----------							
15		Total Nutrients:			28	34	120	5.5
16								

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

6

Title: Class Picnic Budget
Grade: 6
Competency 2.3: Identify spreadsheet terms (e.g., spreadsheet, column, row, cell, formula).
Measure 2.3.1: Label a given diagram of a computer spreadsheet with the correct terms.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.2 The learner will analyze, synthesize, and organize information and discover related ideas, concepts, or generalizations.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr 6)

6.3 Display data using computer software and explore the use of spreadsheets.

Computer Skills: (Gr. 6)

2.3 Identify spreadsheet terms (e.g., spreadsheet, column, row, cell, formula).

Materials Needed: Assorted paper spreadsheet examples; transparencies of the **Introduction Spreadsheets #1, #2, #3,** and **#4** black line masters as well as copies for each student of the **Spreadsheet Activity** black line master; a sheet of 8.5x11 paper for each student; ten sheets of 8.5x11 paper prepared as described in activity; overhead projector.

Time: One class period plus one homework assignment.

TERMS
Spreadsheet
Column
Row
Cell
Label
Value
Formula

Activities

Pre-Activities:

1. Present various examples of paper spreadsheets such as a grocery store receipt, a gradebook, baseball statistics, a table from a textbook, and an accounting ledger. Ask the class to list some characteristics of spreadsheets. Some appropriate answers are:
   - It has lots of numbers.
   - The information is organized in columns and rows.
   - All the information in one column is usually related in some way and all the information in a row is related.
2. Ask students to describe the features of a table of information. They might say that the information is arranged in rows and/or columns, that tables usually have a lot of numbers in them, that all of the information in one column or row is usually related, that the columns and rows are usually labeled making it easy to find information, and that some columns and rows are totaled with the sum at the end of the column or row.
3. Introduct the following spreadsheet definitions and use transparencies of **Introduction to Spreadsheets #1, #2,** and **#3** to locate the following terms:
   - **Spreadsheet:** An applications program, used in financial forecasting, that can quickly handle calculations and perform evaluations.
   - **Column:** The vertical divisions of a spreadsheet that intersect the horizontal divisions (rows) to form cells in which data can be entered. Columns are labeled alphabetically (A,B,C,...AB,AC,AD...).
   - **Row:** The horizontal divisions of a spreadsheet that intersect the vertical divisions (columns) to form cells in which data can be entered. Rows are labeled numerically (1,2,3,4,...).
   - **Cell:** The intersection of a row and a column on a spreadsheet in which data can be entered. Cells are designated by their column letter and row number -- *B4*.
   - **Value:** One type of data that can be entered into a spreadsheet cell. It consists of numbers that can be added, subtracted, etc.
   - **Label:** A type of data that can be entered into a spreadsheet cell. It consists of words that usually label a column or row of numbers.
   - **Formula:** A type of information that can be entered into a spreadsheet cell. It is a mathematical equation consisting of numbers, other cell designators, and symbols for mathematical operations. The result of the formula is displayed in the cell that holds the formula.

	A	B	C
1	Item #	Description	Price
2	1	Peanut butter	$1.25
3	2	Bread	$1.16
4	3	Jelly	$1.59
5	4	Milk	$1.86
6		Total:	$5.86

Notes:

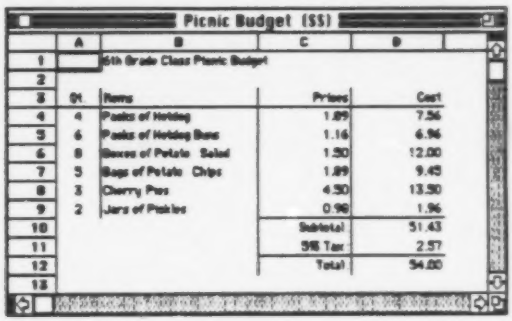
4. Project the **Introduction to Spreadsheets #4** transparency for the class to see and ask the class to answer the following questions:
   - Where is the word Bread? *Cell B3*
   - Where is the price of milk? *Cell C5*
   - What column holds the prices? *Column C*
   - Where is the formula of this spreadsheet? *Cell C6*
   - What is the formula? *=C2+C3+C4+C5 or =SUM(C2...C5)*

Activity:

Preparation

Move student desks into five columns with five desks in each line. It will not alter the lesson if there are not enough students to fill all the desks. If you have more than 25 students, add a sixth row of desks. With a magic marker and 8.5x11 sheets of paper, make one sign of each of the following letters and numbers: A, B, C, D, E, 1, 2, 3, 4, 5. Tape these signs on the wall of your classroom so that they label each column and row of desks in your classroom. Additional signs should be made if extra rows had to be created to accommodate your class size.

1. Use transparencies of **Introduction Spreadsheets #1, #2, and #3** black line masters to help them understand that computer spreadsheets divide the screen into columns and rows. Point out that columns are designated by letters, rows by numbers, and cells (where information is entered into a spreadsheet) by its column letter and row number.
2. Explain to the class that their desks are arranged in columns and rows. Point to the signs and identify the seats in each column and row.
3. Call out column letters and row numbers and ask students who sit in the identified columns and rows to raise their hands.
4. Call out different cell names (e.g., A4, B2, E3 and ask the student sitting in that cell/seat to raise his or her hand. After a minute call on individual students and ask them to tell the cell/seat name of their location.
5. Display the transparency of the **Picnic Budget** black line master.
6. Ask members of the class questions about the spreadsheet to reinforce what they have learned about spreadsheets.



Are all of the food items located in a cell, row, or column?
Is the word Prices entered in a cell, row, or column?
Is the information from cell A4 to A9 values, labels, or formulas?
What is one cell that is probably holding a formula., and what is that forumula probably calculating?
If you changed the number in cell C7, what other cells would probably change automatically?

7. Hand out the copies of the **Spreadsheet Activity** black line master and ask the class to answer the questions for homework.
8. The next day, divide the class into groups of four students, have them compare and come to a consensus on their answers, and then report to the class.

Measure

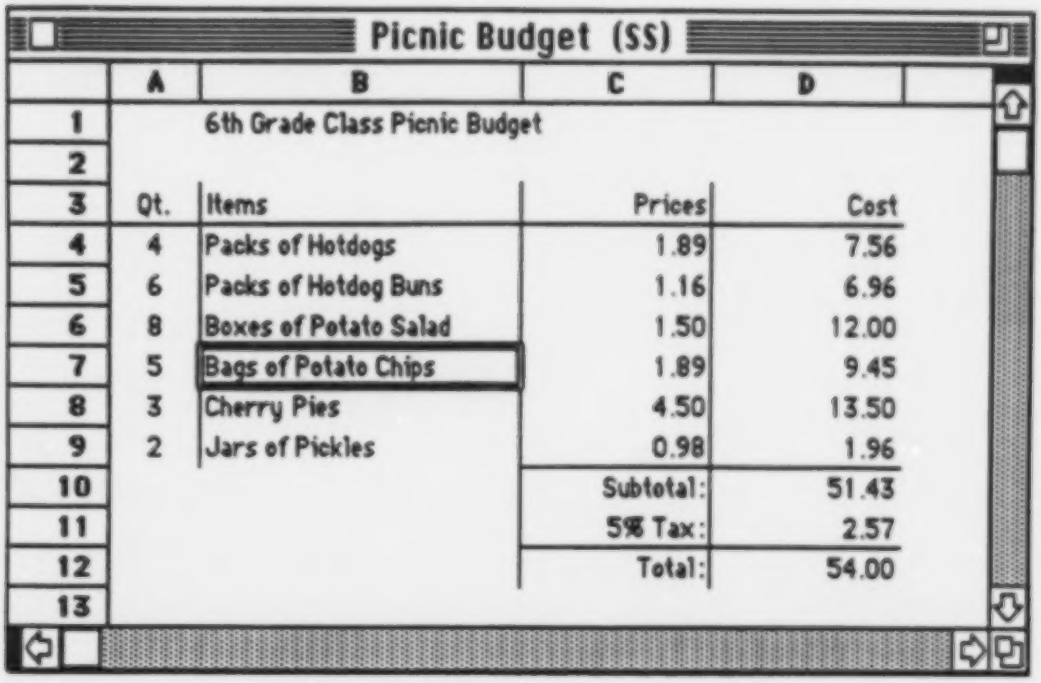
Give each student a diagram of a computer spreadsheet. Have each one label the diagram with the correct terms.

Picnic Budget

Picnic Budget (SS)

	A	B	C	D
1		6th Grade Class Picnic Budget		
2				
3	Qt.	Items	Prices	Cost
4	4	Packs of Hotdogs	1.89	7.56
5	6	Packs of Hotdog Buns	1.16	6.96
6	8	Boxes of Potato Salad	1.50	12.00
7	5	Bags of Potato Chips	1.89	9.45
8	3	Cherry Pies	4.50	13.50
9	2	Jars of Pickles	0.98	1.96
10			Subtotal:	51.43
11			5% Tax:	2.57
12			Total:	54.00
13				

Spreadsheet Activity

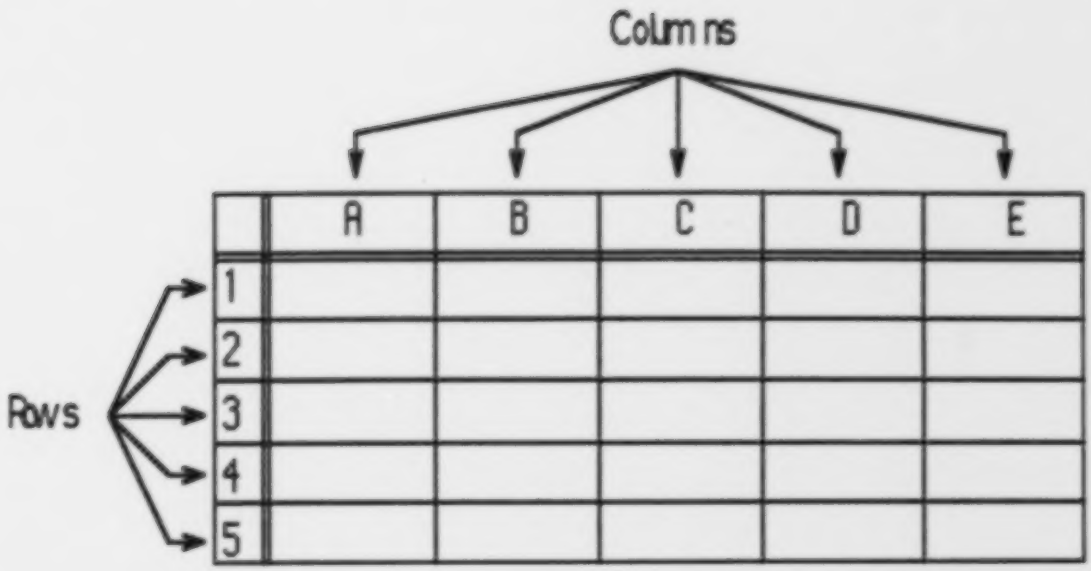


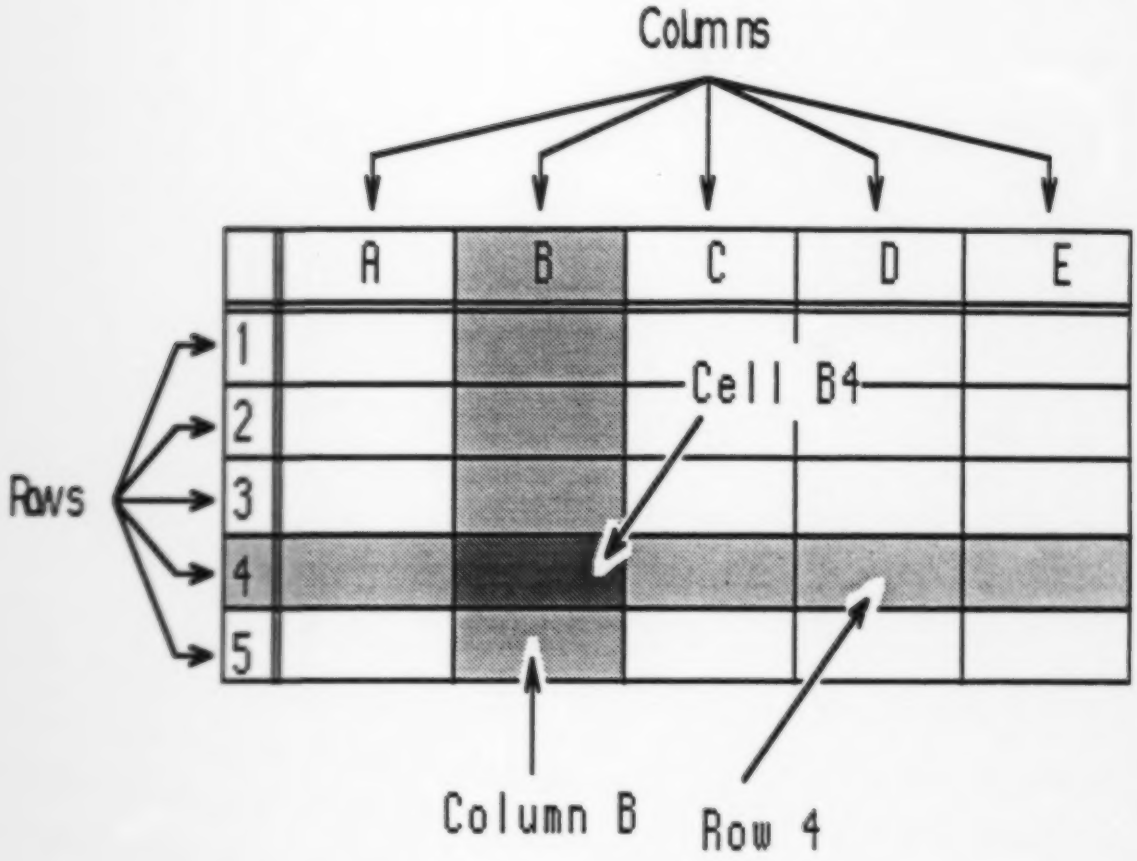
Picnic Budget (SS)

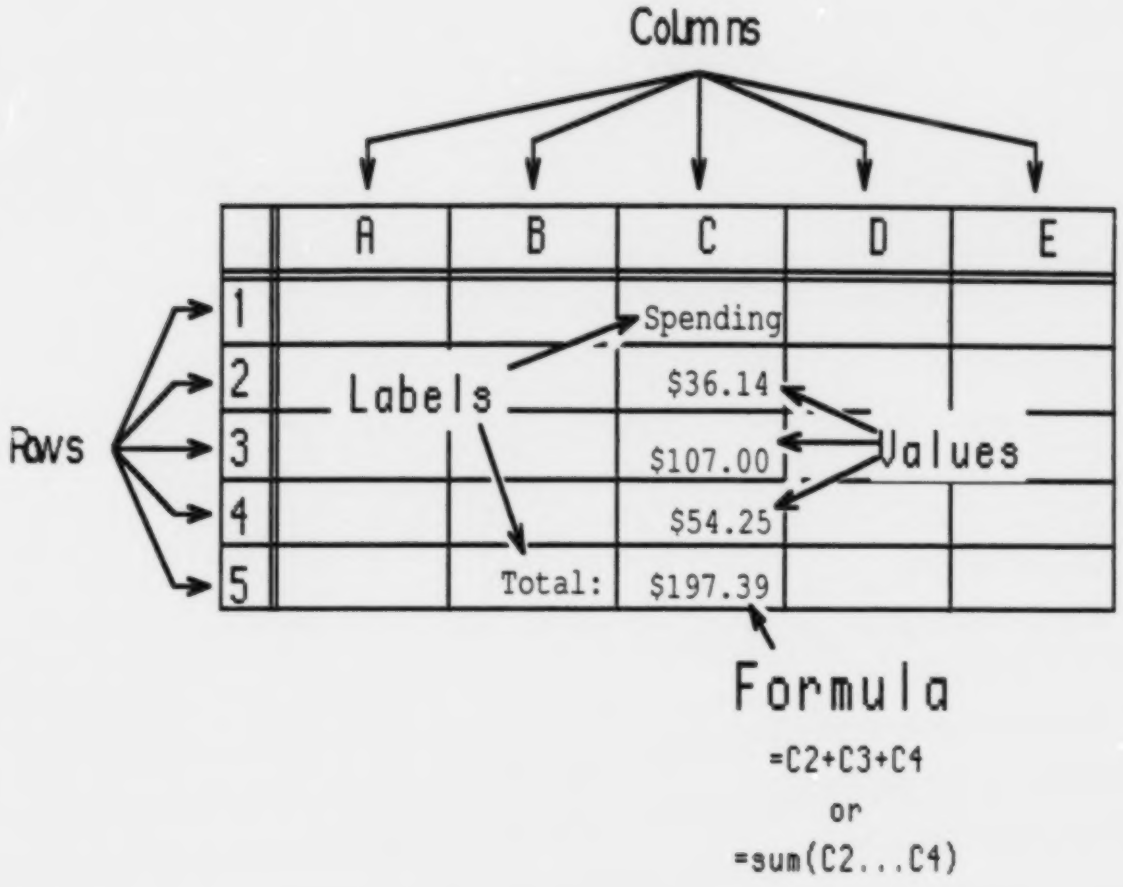
	A	B	C	D
1		6th Grade Class Picnic Budget		
2				
3	Qt.	Items	Prices	Cost
4	4	Packs of Hotdogs	1.89	7.56
5	6	Packs of Hotdog Buns	1.16	6.96
6	8	Boxes of Potato Salad	1.50	12.00
7	5	Bags of Potato Chips	1.89	9.45
8	3	Cherry Pies	4.50	13.50
9	2	Jars of Pickles	0.98	1.96
10			Subtotal:	51.43
11			5% Tax:	2.57
12			Total:	54.00
13				

Instructions: Answer the following questions using the picture of a computer spreadsheet above.

1. What information is entered in cell *B3*?
2. What type of information is in column *A*?
3. What does the information in row *4* concern?
4. Are the prices of the items being purchased for the picnic in a column or a row?
5. Is all of the information about "Packs of Hotdog Buns" located in a column or a row?
6. Is the information in cell *B3* a label, value, or a formula?
7. Is the information in cell *A8* a label, value, or a formula?
8. Is most of the information in column *C* labels, values, or formulas?
9. If cell *D11* holds a formula, what is it calculating?
10. Which cells would change if you changed the number of "Cherry Pies" to 9?


Columns
A
B
C
D
E
Rows
1
2
3
4
5


Columns
A
B
C
D
E
1
2
3
4
5
Rows
Cell B4
Column B
Row 4


Columns
A
B
C
D
E
1
2
3
4
5
Spending
$36.14
$107.00
$54.25
Total:
$197.39
Rows
Labels
Values
Formula
=C2+C3+C4
or
=sum(C2...C4)

	A	B	C
1	Item #	Description	Price
2	1	Peanut butter	$1.25
3	2	Bread	$1.16
4	3	Jelly	$1.59
5	4	Milk	$1.86
6		Total:	$5.86

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

Title: The Heat Tracking Activity
Grade: 7
Competency 2.3: Use a prepared spreadsheet to enter and edit data and explain the results of the changes.
Measure 2.3.1: Given a prepared spreadsheet, enter the temperatures taken from various parts of the classroom and discuss the resulting data.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 7)

1.1 Use models to represent positive and negative rational numbers.

1.2 Compare and order rational numbers in meaningful contexts.

4.2 Make judgements about degree of precision needed and reasonableness of results in measurement situations.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.3 Discuss alternate strategies, evaluate outcomes, and make conjectures and generalizations based on problem situations.

6.4 Draw inferences and construct convincing arguments based on analysis of data.

Materials Needed: Transparency of **Introduction to Spreadsheets #4** black line master; six thermometers and tape; transparencies of the **Thermometer Placement, Temperature Hypothesis Worksheet,** and **Analysis Spreadsheet** black line masters; six copies of the **Temperature Hypothesis Worksheet** black line master; 8.5X11 signs; computer with prepared spreadsheet file. (file=*TEMPCOMP*)

Time: Three class sessions.

TERMS
Column
Row
Cell
Label
Value
Formula
Edit
Enter

Activities

Pre-Activities:

1. Review spreadsheet concepts of: row, column, cell, values, labels, and formulas.
2. Project the **Introduction to Spreadsheets #4** transparency for the class to see and ask the class to answer the following questions:
   - Where is the word Bread? *Cell B3*
   - Where is the price of milk? *Cell C5*
   - What column holds the prices? *Column C*
   - Where is the formula of this spreadsheet? *Cell C6*
   - What is the formula? *=C2+C3+C4+C5 or =SUM(C2...C5)*
   - Is **Jelly** a label or a value? *Label*

	A	B	C
1	Item #	Description	Price
2	1	Peanut butter	$1.25
3	2	Bread	$1.16
4	3	Jelly	$1.59
5	4	Milk	$1.86
6		Total:	$5.86

Activity:

Tape six thermometers to the walls of your classroom along with 8.5x11 signs (locations A, B, C, D, E, F) in the locations described in the **Thermometer Placement** black line master.

Activity 1 Hypotheses

1. Explain to the class that they are going to be using a computer spreadsheet to test some hypotheses about the behavior of heat in their classroom.
2. Project the transparency of the **Thermometer Placement** black line master. Describe the locations of each thermometer. Explain that you want the students to make some hypotheses of how the temperatures in the classroom will change from location to location and from the beginning to the end of the school day.
3. Divide the class into groups of three or four students and label them alphabetically from "A" to "F". Hand out copies of the **Temperature Hypotheses Worksheet** black line master to each group and project a transparency of this handout.
4. Explain that each group is to read each of the questions for their group and develop a hypothesis about heat related to the question: if the temperature would be "higher" or "lower."
5. Explain that they must also be able to explain their hypotheses. Give the groups

BEST COPY AVAILABLE

Science: (Gr.7)

2.2 Demonstrate the ability to classify.

2.3 Demonstrate the ability to use numbers.

2.4 Demonstrate the ability to communicate.

2.5 Demonstrate the ability to measure.

2.6 Demonstrate the ability to infer.

2.7 Demonstrate the ability to predict.

2.8 Demonstrate the ability to use space-time relations.

2.9 Demonstrate the ability to interpret data.

2.13 Demonstrate the ability to formulate hypotheses.

3.3 Demonstrate the ability to use scientific materials and equipment.

Computer Skills: (Gr. 7)

2.3 Use a prepared spreadsheet to enter and edit data and explain the results of the changes.

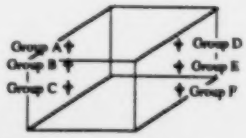
Notes:

about 15 minutes to answer their questions and compose their justification.

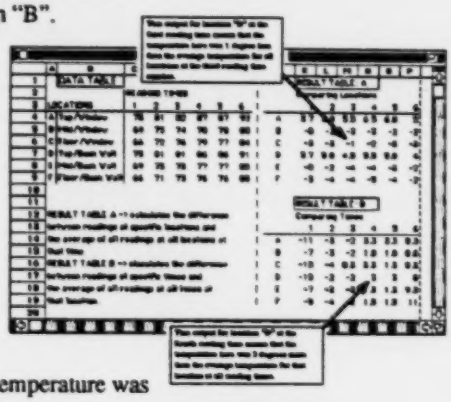
6. Ask a representative from each group to report their answers/hypotheses and justification. Give the class an opportunity to react to each group's hypotheses. Record the hypotheses on the transparency using an erasable transparency marker.

Activity 2: Data Collection

1. Project a transparency of the **Analysis Spreadsheet** black line master and use it to help describe each section of the spreadsheet. Explain that they will enter the actual temperatures into the spreadsheet tomorrow. Assign each group a time to read one of the thermometers.



   a. The *Data Table* is where the temperature data was entered into the spreadsheet.
   b. The *Result Table: A* calculates a comparison between each location and the same location at other times. The values in the table represent the number of degrees higher or lower than the mean (average) of all times at the same location. For instance, a value of -2 for location "B" during period "2" means that location "B" was 2 degrees below the mean temperature of all periods at location "B".
   c. The *Result Table: B* calculates a comparison between each reading and all other readings during the same time. The values in the table represent the number of degrees higher or lower than the mean (average) of all locations at that time. For instance, a value of 1.8 for location "B" during period "4" means that location "B" was a half degree more than the mean of all locations during period "4". Negative numbers indicate that the temperature was below the room mean.



2. Have a computer set up in the classroom running the spreadsheet file *TempComp*. During the day have students check the temperatures at their assigned site and enter the temperatures into the *TEMPCOMP* spreadsheet.

Activity 3: Data Analysis

Print out the *TempComp* spreadsheet and make copies for each group.

1. Divide the class into the groups that were designated during Activity 1. Project a transparency of **Analysis Spreadsheet** black line master and review each section of the spreadsheet.
2. Ask each group to examine the spreadsheet printout and determine if their hypotheses were supported by the data. Discuss as a total group any major differences in the hypothesis and the results that are discovered.
3. Ask each group to design another experiment assuming that they have all the money and materials needed to further test their hypotheses. They should describe the data that would be generated by the experiment and how a computer spreadsheet would be used to manage the data. Have a representative of each group report their conclusions and briefly describe their experiment.

Measure

Students will collect temperature readings every hour during the day and enter them into a prepared spreadsheet that calculates the average temperature. Students will discuss the resulting data.

Science: (Gr.7)

2.2 Demonstrate the ability to classify.

2.3 Demonstrate the ability to use numbers.

2.4 Demonstrate the ability to communicate.

2.5 Demonstrate the ability to measure.

2.6 Demonstrate the ability to infer.

2.7 Demonstrate the ability to predict.

2.8 Demonstrate the ability to use space-time relations.

2.9 Demonstrate the ability to interpret data.

2.13 Demonstrate the ability to formulate hypotheses.

3.3 Demonstrate the ability to use scientific materials and equipment.

Computer Skills: (Gr. 7)

2.3 Use a prepared spreadsheet to enter and edit data and explain the results of the changes.

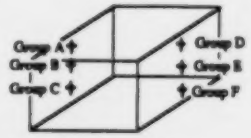
Notes:

about 15 minutes to answer their questions and compose their justification.

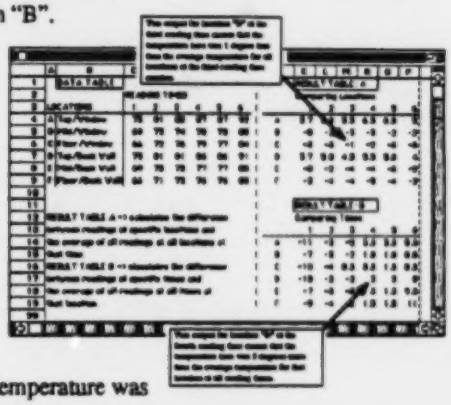
6. Ask a representative from each group to report their answers/hypotheses and justification. Give the class an opportunity to react to each group's hypotheses. Record the hypotheses on the transparency using an erasable transparency marker.

Activity 2: Data Collection

1. Project a transparency of the **Analysis Spreadsheet** black line master and use it to help describe each section of the spreadsheet. Explain that they will enter the actual temperatures into the spreadsheet tomorrow. Assign each group a time to read one of the thermometers.



   a. The *Data Table* is where the temperature data was entered into the spreadsheet.
   b. The *Result Table: A* calculates a comparison between each location and the same location at other times. The values in the table represent the number of degrees higher or lower than the mean (average) of all times at the same location. For instance, a value of -2 for location "B" during period "2" means that location "B" was 2 degrees below the mean temperature of all periods at location "B".
   c. The *Result Table: B* calculates a comparison between each reading and all other readings during the same time. The values in the table represent the number of degrees higher or lower than the mean (average) of all locations at that time. For instance, a value of 1.8 for location "B" during period "4" means that location "B" was a half degree more than the mean of all locations during period "4". Negative numbers indicate that the temperature was below the room mean.



2. Have a computer set up in the classroom running the spreadsheet file *TempComp*. During the day have students check the temperatures at their assigned site and enter the temperatures into the *TEMPCOMP* spreadsheet.

Activity 3: Data Analysis

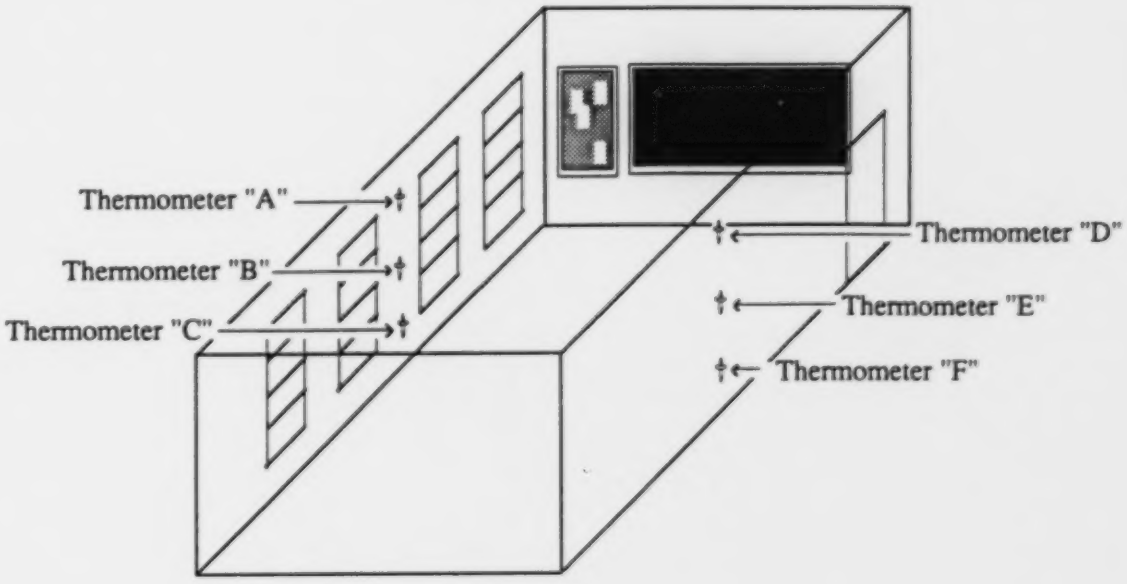
Print out the *TempComp* spreadsheet and make copies for each group.

1. Divide the class into the groups that were designated during Activity 1. Project a transparency of **Analysis Spreadsheet** black line master and review each section of the spreadsheet.
2. Ask each group to examine the spreadsheet printout and determine if their hypotheses were supported by the data. Discuss as a total group any major differences in the hypothesis and the results that are discovered.
3. Ask each group to design another experiment assuming that they have all the money and materials needed to further test their hypotheses. They should describe the data that would be generated by the experiment and how a computer spreadsheet would be used to manage the data. Have a representative of each group report their conclusions and briefly describe their experiment.

Measure

Students will collect temperature readings every hour during the day and enter them into a prepared spreadsheet that calculates the average temperature. Students will discuss the resulting data.

Thermometer Placement



Temperature Hypotheses Worksheet

Names _____

Comparing different locations and times

Group 1

1. Will the temperature of location "A" be higher or lower than the average temperature of all locations at any given time?

   Higher [ ] Lower [ ]

2. Will the temperature of the first time period be higher or lower than the average temperature of all time periods?

   Higher [ ] Lower [ ]

Group 2

1. Will the temperature of location "B" be higher or lower than the average temperature of all locations at any given time?

   Higher [ ] Lower [ ]

2. Will the temperature of the second time period be higher or lower than the average temperature of all time periods?

   Higher [ ] Lower [ ]

Group 3

1. Will the temperature of location "C" be higher or lower than the average temperature of all locations at any given time?

   Higher [ ] Lower [ ]

2. Will the temperature of the third time period be higher or lower than the average temperature of all time periods?

   Higher [ ] Lower [ ]

Group 4

1. Will the temperature of location "D" be higher or lower than the average temperature of all locations at any given time?

   Higher [ ] Lower [ ]

2. Will the temperature of the fourth time period be higher or lower than the average temperature of all time periods?

   Higher [ ] Lower [ ]

Group5

1. Will the temperature of location "E" be higher or lower than the average temperature of all locations at any given time?

   Higher [ ] Lower [ ]

2. Will the temperature of the fifth time period be higher or lower than the average temperature of all time periods?

   Higher [ ] Lower [ ]

Group 6

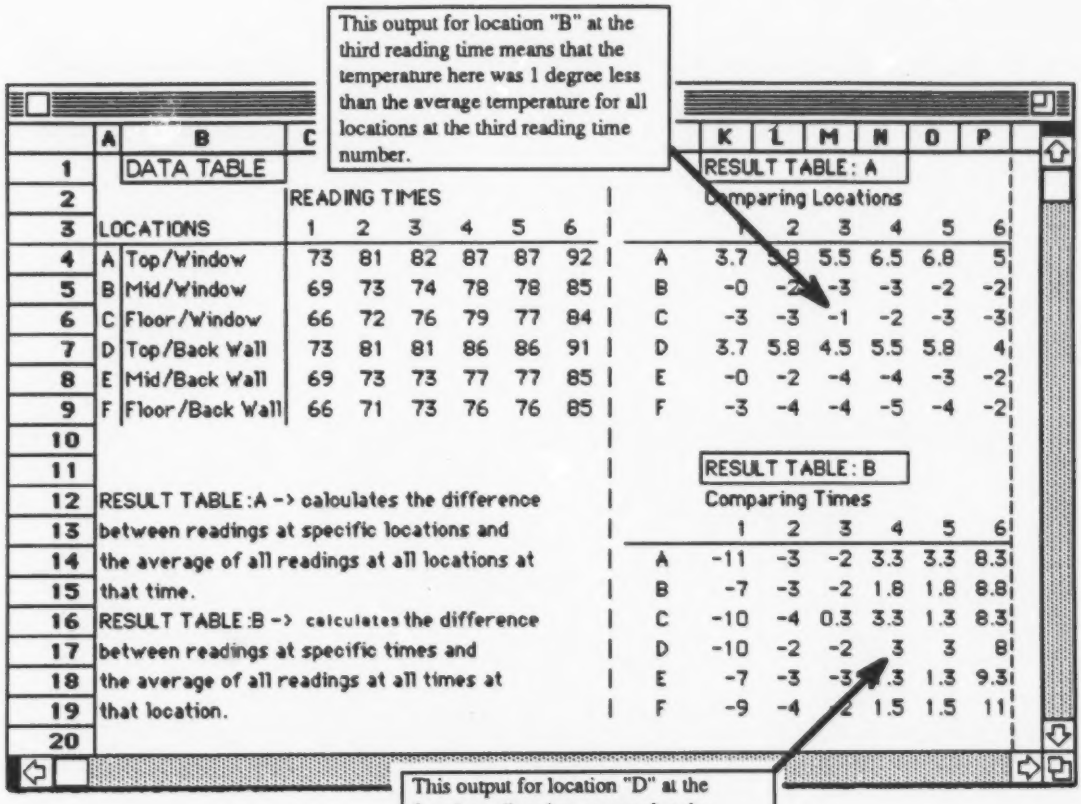
1. Will the temperature of location "F" be higher or lower than the average temperature of all locations at any given time?

   Higher [ ] Lower [ ]

2. Will the temperature of the sixth time period be higher or lower than the average temperature of all time periods?

   Higher [ ] Lower [ ]

Analysis Spreadsheet



DATA TABLE

			READING TIMES					
LOCATIONS			1	2	3	4	5	6
A	Top/Window		73	81	82	87	87	92
B	Mid/Window		69	73	74	78	78	85
C	Floor/Window		66	72	76	79	77	84
D	Top/Back Wall		73	81	81	86	86	91
E	Mid/Back Wall		69	73	73	77	77	85
F	Floor/Back Wall		66	71	73	76	76	85

RESULT TABLE: A

Comparing Locations

	1	2	3	4	5	6
A	3.7	5.8	5.5	6.5	6.8	5
B	-0	-2	-3	-3	-2	-2
C	-3	-3	-1	-2	-3	-3
D	3.7	5.8	4.5	5.5	5.8	4
E	-0	-2	-4	-4	-3	-2
F	-3	-4	-4	-5	-4	-2

RESULT TABLE: B

Comparing Times

	1	2	3	4	5	6
A	-11	-3	-2	3.3	3.3	8.3
B	-7	-3	-2	1.8	1.8	8.8
C	-10	-4	0.3	3.3	1.3	8.3
D	-10	-2	-2	3	3	8
E	-7	-3	-3	1.3	1.3	9.3
F	-9	-4	-2	1.5	1.5	11

RESULT TABLE: A -> calculates the difference between readings at specific locations and the average of all readings at all locations at that time.

RESULT TABLE: B -> calculates the difference between readings at specific times and the average of all readings at all times at that location.

This output for location "B" at the third reading time means that the temperature here was 1 degree less than the average temperature for all locations at the third reading time number.

This output for location "D" at the fourth reading time means that the temperature here was 3 degrees more than the average temperature for that location at all reading times.

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

7

Title: "Batters Up"
Grade: 7
Competency 2.3: Use a prepared spreadsheet to enter and edit data and explain the results of the changes.
Measure 2.3.2: Given a prepared spreadsheet for calculating batting averages, change the number of times at bat or the number of hits and describe how the batting average changed.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 7)

1.1 Use models to represent positive and negative rational numbers.

1.2 Compare and order rational numbers in meaningful contexts.

4.2 Make judgements about degree of precision needed and reasonableness of results in measurement situations.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.3 Discuss alternate strategies, evaluate outcomes, and make conjectures and generalizations based on problem situations.

6.4 Draw inferences and construct convincing arguments based on analysis of data.

Computer Skills: (Gr. 7)

2.3 Use a prepared spreadsheet to enter and edit data and explain the results of the changes.

Materials Needed: Copies of the **Batters Up Spreadsheet** black line master for each student; transparency of the **Batters Up Spreadsheet** black line master; one computer with the *baseball* file loaded; two board game dice; erasable transparency marker; overhead projector.

Time: One class session.

Activities

Pre-Activities:
1. Review spreadsheet concepts and terms.

TERMS
Column
Row
Cell
Label
Value
Formula
Enter
Edit

Activity:
1. Prepare to play **Batters Up**.
   a. Divide the class into two teams. This may be done before class time.
   b. Enter the names of each team into the *BASEBALL* spreadsheet on a computer set up in the front of the classroom. (This may be done before class time.)
   c. Give each student a copy of the **Batters Up Spreadsheet** black line master.
2. Deliver instructions.
   a. Explain to the class that they will be playing a simulated baseball game. Rather than using a bat and ball, they will be using two board game dice to determine what they do at the plate.
   b. Also explain that they will be entering their performance into a computer spreadsheet which will be calculating their batting averages. Each student will edit their **Times at Bat** cell and also their **Hits**, if they earn a hit.
   c. Display the following information from the **Batters Up Spreadsheet** black line master:

Dice	Action
2, 3, or 4	Base hit/single
5	Double
6	Triple
7	Home run
8 or 9	Strike out
10	Fly out
11 or 12	Thrown out

   d. Explain that as each student throws the dice, they should announce what their throw means -- whether they earned a hit, or flied out, etc. They should also explain what they are doing as they enter/edit their data in the spreadsheet. As an example:

Johnny is up to bat for the third time. He has earned one hit so far. Johnny

BEST COPY AVAILABLE

Notes:

throws a three. He should walk over to the computer and explain that he is changing his 2 for "Times At Bat" to a three, and that he is changing his "Hits" from a 1 to a 2. Johnny should also announce that his "Batting Average" has changed from .500 to .667.

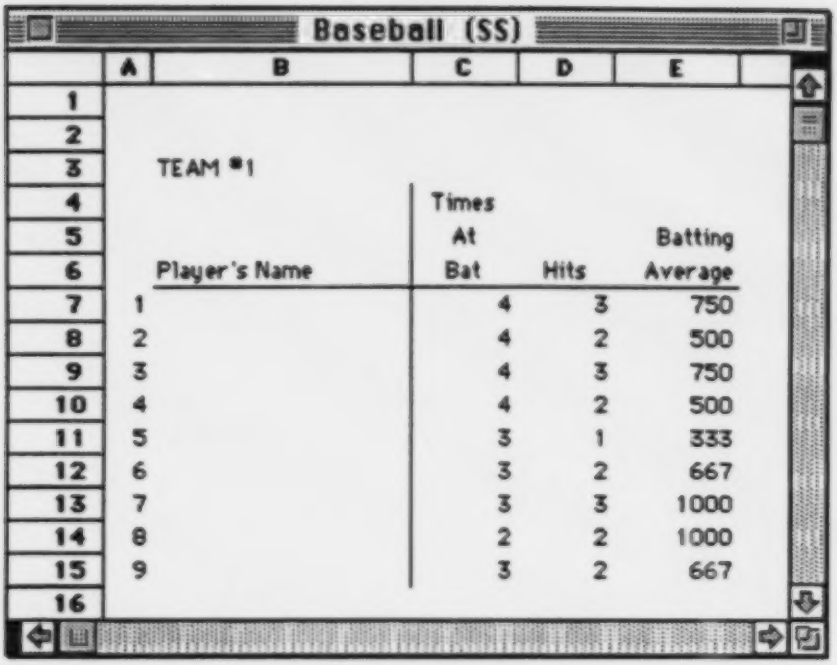
e. Explain that when one team has three outs, the second team will take turns throwing the dice and editing the spreadsheet.

3. Begin play.

Measure

Given a prepared spreadsheet for calculating batting averages, students will edit the times at bat and hits and observe the resulting changes in batting average.

Batters Up Spreadsheet



Dice	Action
2, 3, or 4	Base hit/single
5	Double
6	Triple
7	Home run
8 or 9	Strike out
10	Fly out
11 or 12	Thrown out

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

Title: Grade Master Activity
Grade: 7
Competency 2.3: Use a prepared spreadsheet to enter and edit data and explain the results of the changes.
Measure 2.3.3: Given a spreadsheet of student grades, change one or more grades and describe how the average changes.

Materials Needed: A folded sheet of paper for each class member with some grades printed or written on the inside; computer in the classroom with the *SingleGB* file loaded or a lab of computers with the *SingleGB* file loaded in each system; transparency of the **Spreadsheet Illustration** black line master; overhead projector.

Time: One class session

Activities

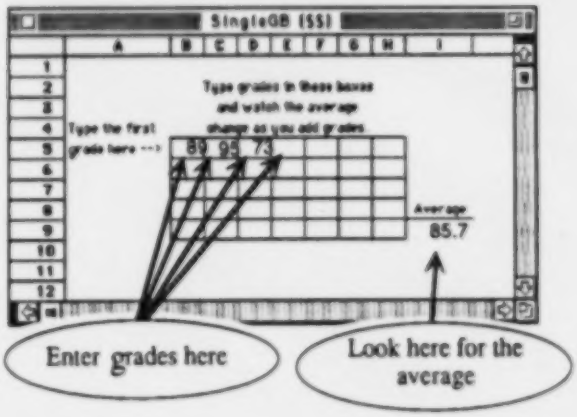
Pre-Activities:

1. Review spreadsheet concepts and terms.

TERMS
Column
Row
Cell
Label
Value
Formula
Enter
Edit

Activity:

1. Announce to the class that they will be using a computer to track the averages of some grades.
2. While handing out a list of some grades, explain that they will be entering their grades into a computer spreadsheet and watching the average change as they add each grade.
3. Project a transparency of the **Spreadsheet Illustration** black line master #1 for the class to see. Write some sample grades into the appropriate cells to illustrate how students will enter their grades into the spreadsheet. If possible, conduct the demonstration using a computer with an LCD palette to project the computer screen image on the wall for the class to see.
4. Have students enter their grades into the computer, either taking turns at a limited number of computers or all together on a lab.
5. Explain that each student should observe what happens to the average as each new grade is entered.
6. Each student should clear their grades from the spreadsheet when they have gotten their average so that other students will not be able to see their grades in the future.
7. Ask a member of the class to explain what was happening to the average as they typed in each new grade. An appropriate answer might be that as each new grade was entered, the computer re-calculated the average for the grades that were included on the screen at that time.
8. Divide the class into groups of three or four and ask them to identify at least one other way that a computer spreadsheet might be used.



Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 7)

1.1 Use models to represent positive and negative rational numbers.

1.2 Compare and order rational numbers in meaningful contexts.

4.2 Make judgements about degree of precision needed and reasonableness of results in measurement situations.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.3 Discuss alternate strategies, evaluate outcomes, and make conjectures and generalizations based on problem situations.

6.4 Draw inferences and construct convincing arguments based on analysis of data.

Computer Skills: (Gr. 7)

2.3 Use a prepared spreadsheet to enter and edit data and explain the results of the changes.

BEST COPY AVAILABLE

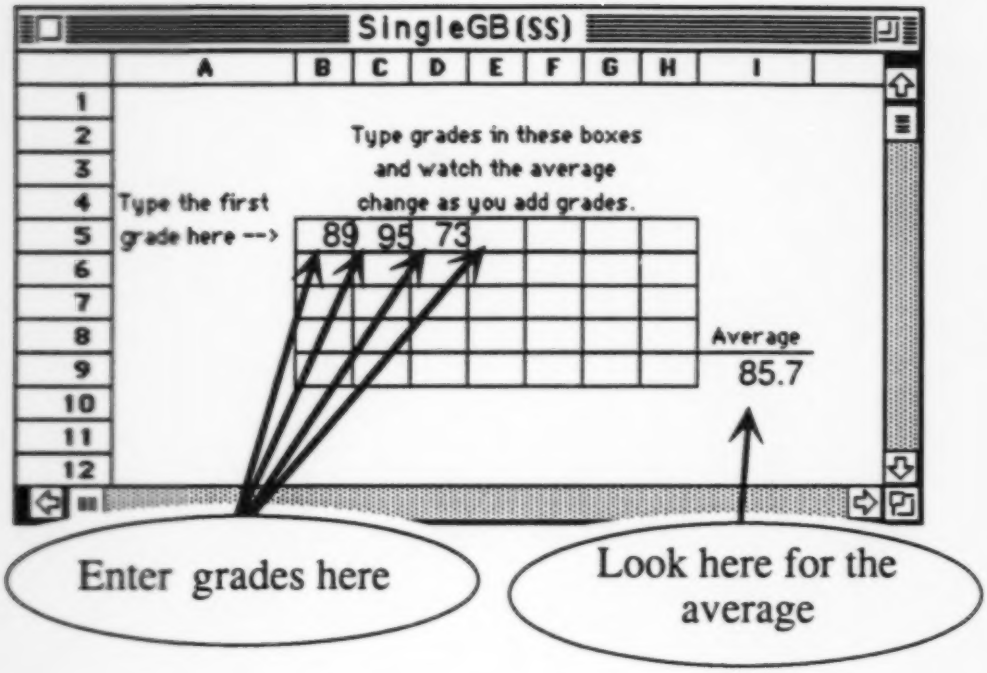
Notes:

9. After about 10 minutes, ask a representative of each group to report on their idea(s).

Measure

Given a prepared spreadsheet for calculating grade averages, students will enter grades and describe how the average changes with the addition or editing of each grade.

Spreadsheet Illustration



ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

7

Title: Class of "Characters"
Grade: 7
Competency 3.2: Enter and edit data into a prepared spreadsheet to test simple "What if?" statements.
Measure 3.2.1: Given a spreadsheet of student grades, enter different numbers for the last test score to determine what scores would earn a final average higher than 90.

Materials Needed: Scorekeeper's notebook with data for some school sport; handouts and transparency of the **GradeBook Spreadsheet** black line master; overhead projector; a lab of computers running the spreadsheet file, *GradBK2* or a single computer in the classroom.

Time: Two class sessions.

Activities

TERMS
Columns
Rows
Cells
Labels
Values
Formulas

Pre-Activities:

1. Review spreadsheet concepts and terms.
2. Show the class an example of a sports (basketball, soccer, hockey) scorekeeper's notebook. Ask the students to identify the parts of the scorekeeper's information using spreadsheet terms.
3. Have the students make up statements like "What if (name) scores a goal, then how will the team scoring average change?".
4. Discuss with the students the benefits of using a spreadsheet for solving these questions instead of doing all the calculations by hand.

Activity:

1. Announce to the class that they are going to create an electronic gradebook and enter grades for any well known character they want: Donald Duck, Babe Ruth, Hillary Clinton, etc.

2. Divide the class into groups of 3 or 4 students. Ask each group to spend about five minutes thinking of the character they want to use.

3. While students are discussing their choices, pass out a copy of the black line master **GradeBook Spreadsheet** to each group. Also project a transparency of the same black line master for the class to see.

4. After each group has selected their character, ask them to write the name of the character in the name column. Model this by writing the name of a character on the transparency using an erasable transparency marker.

5. Explain that their personality has already earned five grades:

    1. A test on the early explorers of the New World
    2. A homework assignment on math word problems
    3. A book report on a book they read during the summer
    4. A test on earthquakes and volcanoes
    5. An essay on what's wrong and what's right with TV

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 7)

1.1 Use models to represent positive and negative rational numbers.

1.2 Compare and order rational numbers in meaningful contexts.

4.2 Make judgements about degree of precision needed and reasonableness of results in measurement situations.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.3 Discuss alternate strategies, evaluate outcomes, and make conjectures and generalizations based on problem situations.

6.4 Draw inferences and construct convincing arguments based on analysis of data.

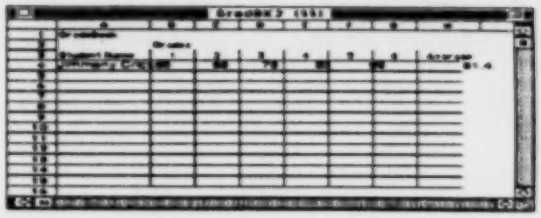
Computer Skills: (Gr. 7)

3.2 Enter and edit data into a prepared spreadsheet to test simple "What if?" statements.

SPREADSHEETS

BEST COPY AVAILABLE

Notes:



6. Ask the students in each group to work together and decide what grade their character might have earned on each of these activities and assignments and write the grades down on their Gradebook Spreadsheet handout by their character's name.

7. Have each group come to the computer which has the *GradeBK2* spreadsheet file loaded, and type their character's name and grades onto the next free row. Ask the students to watch the **Average** column and see how the numbers change each time a new grade is typed in. Ask the students as they finish typing in their data, to describe what was happening in the **Average** column.

8. Next explain to the entire class that their class of characters has one more assignment. They will each take a test on the proper use of the comma. Ask the class the following questions:

   Q1 What would happen if you came to the computer and typed in a grade of "84" for the sixth assignment?
   Answer: The new average will appear in the **Average** column calculated from the new grade.
   Q2 What would happen if you changed the last grade from "84" to "70"?
   Answer: A new average would appear in the **Average** column based on the new grade. The new average would be lower because the last grade was lower.
   Q3 How might you use this technique to figure out the lowest grade your character needs to make in order to have an average of 88 or greater?
   Answer: Keep trying numbers in the column for the last grade until you get an average of at least 88. (The explanation here could be more complex in terms of technique and strategy.)

9. Tell the class that each group is going to come to the computer and enter/edit the grade for the grade 6 test until they have identified the lowest grade that their character could earn on that test in order to have an average of at least 88.

10. After each group has found the necessary grade for their character, have a representative from each group report who their character is and what grade the character had to earn to get an average of at least 88.

11. Ask the class what sort of question they are asking when they changed the grade each time. An appropriate answer should have the word "if" in it. You are asking the question, "If I try a 75, what will the average of all grades be?" Explain that the ability to solve "what if" problems is a very important benefit of computer spreadsheets. Since spreadsheets can make many calculations very quickly, a problem solver can try different solutions and observe the outcome almost instantly.

Measure

Given a spreadsheet of test grades, students will enter different numbers for the last test score to determine what score would earn a final average higher than 90. Have each student identify the necessary test score and explain how the spreadsheet is useful to answer "what if" questions to solve a problem.

BEST COPY AVAILABLE

Gradebook Spreadsheet

GradBK2 (SS)

	A	B	C	D	E	F	G	H
1	Gradebook							
2		Grades						
3	Student Name	1	2	3	4	5	6	Average
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

7

Title: Count the Calories
Grade: 7
Competency 3.2: Enter and edit data into a prepared spreadsheet to test simple "What if?" statements.
Measure 3.2.2: Given a prepared spreadsheet of activities (e.g., running, swimming, walking) and their caloric expenditure, enter time segments for four activities sufficient to burn a total of *n* calories.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 7)

1.1 Use models to represent positive and negative rational numbers.

1.2 Compare and order rational numbers in meaningful contexts.

4.2 Make judgements about degree of precision needed and reasonableness of results in measurement situations.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.3 Discuss alternate strategies, evaluate outcomes, and make conjectures and generalizations based on problem situations.

6.4 Draw inferences and construct convincing arguments based on analysis of data.

Computer Skills: (Gr. 7)

3.2 Enter and edit data into a prepared spreadsheet to test simple "What if?" statements.

Materials Needed: An empty food box or wrapper, that has the number of calories per serving printed on the box, for each student; one or more computers in the classroom with the *Calories* prepared spreadsheet file loaded or access to a computer lab with the *Calories* file loaded on each computer; transparency of the **Exercise/Calories** blackline master; handout for each student of the **Exercise/Calories Activity** blackline master.

Time: One or two class sessions.

TERMS
Columns
Rows
Cells
Labels
Values
Formulas

Activities

Pre-Activities:

1. Review spreadsheet concepts and terms.
2. Show the class some examples of printed nutritional information on food containers. Ask them to identify what they would do to determine the amount of a particular nutrient if they had two servings? Three servings? 5 1/2 servings?
3. Ask students to describe the benefits of having the nutritional information in a spreadsheet. Remind the class that spreadsheets help solve this type of "what if" question by making the calculations very quickly so the problem solver can try different values easily and quickly.
4. Have the students, in pairs, examine the food boxes and wrappers for the activity in order to locate the calorie count for each serving.

Activity:

Note: The day before, ask each student to bring in a wrapper or box for some food item that has the number of calories per serving printed on the wrapper or box.

1. Explain to the class that they are going to use a computer spreadsheet to discover how different activities burn calories. Project a transparency of the **Exercise/Calories** blackline master. Also hand out copies of the **Exercise/Calories Activity** to each member of the class.

2. Pointing to the transparency, describe each of the sections of the spreadsheet: where they will enter a weight value (since a person's weight helps determine how many calories are burned by various activities), where they will enter the amount of time spent on different activities, and where they will see the number of calories that are burned by the activities.

3. Have a member of the class come to one of the computers to act as the operator and explain that the operator will be keying the values that the class tells him/her in order to solve the first two problems on their sheet.

4. Call on a student in class to provide a weight value. The operator should move the selector to the cell for entering the weight. This will be cell C2. Have the operator explain to the rest of the class how he/she is moving the selector and entering the

SPREADSHEETS

BEST COPY AVAILABLE

Notes:

information. The operator may need some assistance in doing this.

5. Ask a member of the class to read the first question.

   If you jog for 30 minutes, how many calories would you burn?

   Ask the class if anyone can tell how they would use the computer spreadsheet to solve this problem. An appropriate answer would be to enter the number 30 to the right of "Jogging:" in cell C10. The answer will appear in the same row but in the column titled *Number of Calories* and in cell F17 at the bottom right hand side of the screen by *Total Number of Calories:*..

6. Ask a member of the class to read the next question.

   If you spent an additional hour throwing frisbee, how many calories would you burn?

   Ask the class if anyone can tell how they would use the computer spreadsheet to solve this problem. An appropriate answer would be to enter the number 60 to the right of "Playing Fresbee:" in cell C12. The answer will appear in the same row but in the column titled *Number of Calories* and at the bottom right hand side of the screen by *Total Number of Calories:*..

7. If you have a limited number of computers, collect the food boxes and wrappers and place them at the computer(s). If the class is using a computer lab, then they should keep their boxes and wrappers with them.

8. Explain that for the next 6 questions, they should use a different food item box or wrapper for each question. If they are working at a computer lab, students should swap boxes/wrappers with their neighbor to answer each question. Explain that after finding each answer, they should write an explanation of how they solved the problem. For example, "My food item was Fritos which has 150 calories. I kept entering different times in the cell C12 until the number of calories was equal to or just greater than the number in the serving of Fritos."

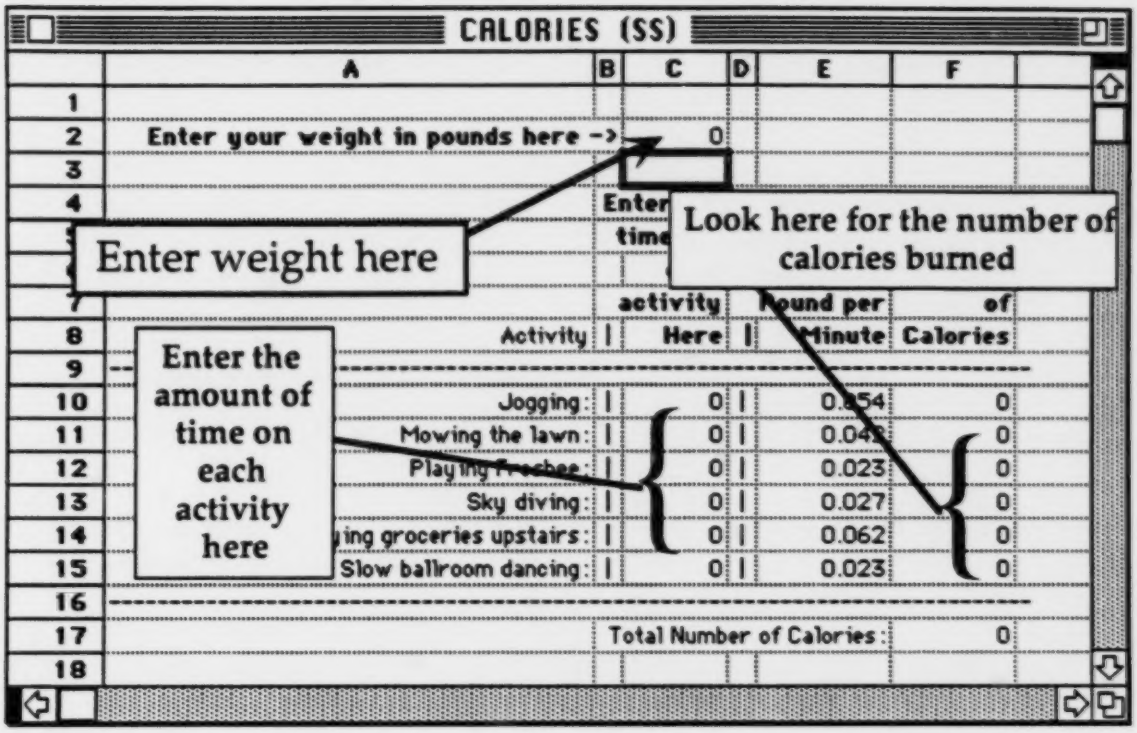
9. Divide the class into groups of three to solve problems 9 and 10.

10. Ask members of the class to report on each problem, explaining how they solved each problem. Emphasize how they are solving "What if?" problems. Also ask members of the class to report on the additional ways that computer spreadsheets can be used to solve "What if?" statements (problem #10).

Measure

Give students a prepared spreadsheet of activities (e.g., jogging, playing frisbee, sky diving) and their caloric expenditure. Have students, individually, enter time segments for four activities to determine the time per activity sufficient to burn a total of 1560 calories.

Exercise/Calories



Exercise/Calories Activity

Name_____

1. If you jog for 30 minutes, how many calories will you burn?

2. If you spent an additional hour throwing frisbee, how many calories would you burn in all?

3. What food item are you using?
How many calories per serving?
How long would you have to dance, slow ballroom style, to burn off all of the calories of one serving?

Explain your answer:

4. What food item are you using?
How many calories per serving?
How long would you have to mow the lawn to burn off all of the calories of two servings?
Explain your answer:

5. What food item are you using?
How many calories per serving?
How long would you have to carry groceries upstairs to burn off all of the calories of one serving?

Explain your answer:

6. What food item are you using?
How many calories per serving?
If you jogged 15 minutes to the airport and mowed grass for and hour, how long would you have to sky dive to burn off all the calories of three servings.
Explain your answer:

7. What food item are you using?
How many calories per serving?
If you jogged to the dance studio for a half-hour, danced in slow ballroom style for two hours, and jogged home, what is the lowest number of servings that you could eat and gain some calories?
Explain your answer:

8. What food item are you using?
How many calories per serving?
If your neighbor asked you to mow his lawn and it took you six hours to finish the job, how many servings of this food item could you eat afterward without gaining any calories?
Explain your answer:

9. You have gained 3000 calories as a result of your dinner. List three activities with their lengths of time to burn 750 calories.

Activity	Length of Time	Total Calories

Explain your answer:

10. Describe another way that a spreadsheet could be used to solve problems.

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

Title: Astronomy Mission
Grade: 8
Competency 3.2: Enter and edit data into a prepared spreadsheet to test "What if?" statements.
Measure 3.2.1: Given a prepared spreadsheet with the relative gravity of each planet, determine the weight of five objects on each planet.

Materials Needed: Poster of the solar system; listing of facts on each planet; four "Earth objects" (e.g., textbook, shoe, flower pot, lb. of coffee); bathroom scales; transparencies of **Astronomy Mission Spreadsheet Illustration**, **Astronomy Mission Spreadsheet Example #1**, **Astronomy Mission Spreadsheet Example #2** ; a handout for each class member of the **Astronomy Mission Activity Sheet**; overhead projector; prepared spreadsheet file *Planets*; computers.

Time: One class session.

TERMS
Columns
Rows
Cells
Labels
Values
Formulas

Activities

Pre-Activities:

1. Show the class a poster of the solar system and discuss the position of each planet in relation to Earth.
2. Review with the students various facts they have learned about each planet. Include as one of the facts, the gravitational pull on that planet and how that would affect the weight of a person on that planet.
3. Select one planet and identify its gravitational pull.
4. Show the class the four "Earth Objects," weigh each object on the bathroom scales, and ask them to hypothesize about the weight of that object on the selected planet.
5. Discuss with the class how a spreadsheet could be used to calculate these values. Emphasize that this type of "what if" problem solving is a major use of spreadsheets by scientists.

Activity:

1. Explain to the class that they are going to pretend that they are traveling through the solar system with a giant telescope to examine the galaxy. Their task is to leave Earth, land on one of the planets of the solar system, use the telescope to examine local space, take off and return to Earth. Explain that they will be using a computer spreadsheet to determine if they have enough fuel to visit specific planets based on the gravitational pull of the planet and the weight of the crew and cargo (telescope).

2. Project a transparency of the **Astronomy Mission Spreadsheet Illustration** blackline master for the class to see. Point out the following features:
   a. Where the students will be entering their name and the names of three friends. Explain that the pilot is listed first, then the navigator, then the astronomer, and finally the mission specialist on the spreadsheet.
   b. Where they will enter their Earth weights and that the spreadsheet automatically calculates the weight of each of the astronauts on each of the other planets.
   c. Where the students will enter their amount of fuel.
   d. Where the spreadsheet displays the amount of fuel needed for a round-trip visit to each planet from Earth and the amount that would be left. Explain that for the *Fuel Remaining* column if there is a minus (-) by the number, there was not enough fuel to visit that planet and that the number itself is the amount of additional fuel needed to visit the planet.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics: (Gr. 8)

1.1 Explore the real number system by describing and using various forms of numbers in realistic situations.

1.2 Use appropriate estimation techniques in meaningful situations; justify the technique.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.4 Investigate open-ended problems, formulate questions, and extend problem solving situations.

Computer Skills: (Gr. 8)

3.2 Enter and edit data into a prepared spreadsheet to test "What if?" statements.

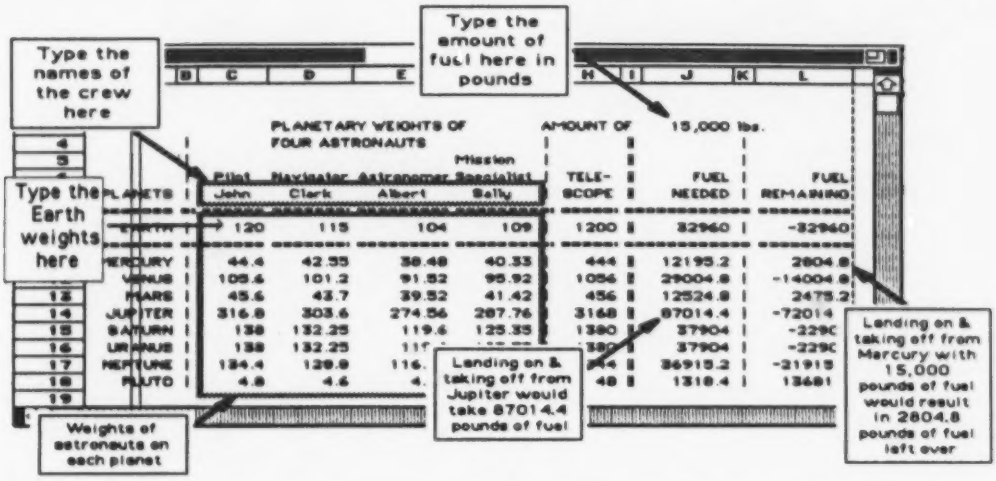
Notes:

3. Ask the class if anyone can explain how they might figure out which planets they would be able to visit with 30,000 pounds of fuel? An appropriate answer would be to enter 30000 for "AMOUNT OF FUEL" and then identify the planets that have a positive amount in the *Fuel Remaining* column.

4. Project transparency of the **Astronomy Mission Spreadsheet Example #1** blackline master. It gives the resulting data for 32,000 pounds of fuel. Ask the class to identify the individual planets they would be able to visit with that much fuel.

5. Next, project transparency of the **Astronomy Mission Spreadsheet Example #2** blackline master and ask the class how much fuel is available. The answer would be 15,000 pounds of fuel. Ask the class to identify the individual planets they would be able to visit with this much fuel.

6. Ask the class how they might determine the lowest amount of fuel necessary to visit Neptune? An appropriate answer would be to try numbers for "AMOUNT OF


Type the names of the crew here
Type the amount of fuel here in pounds
Type the Earth weights here
Weights of astronauts on each planet
Landing on & taking off from Jupiter would take 87014.4 pounds of fuel
Landing on & taking off from Mercury with 15,000 pounds of fuel would result in 2804.8 pounds of fuel left over
PLANETARY WEIGHTS OF FOUR ASTRONAUTS
AMOUNT OF 15,000 lbs.
Mission Specialist
PLANETS | Pilot John | Navigator Clark | Astronomer Albert | Specialist Sally | TELE-SCOPE | FUEL NEEDED | FUEL REMAINING
EARTH | 120 | 115 | 104 | 109 | 1200 | 32960 | -32960
MERCURY | 44.4 | 42.55 | 38.48 | 40.33 | 444 | 12195.2 | 2804.8
VENUS | 105.6 | 101.2 | 91.52 | 95.92 | 1056 | 29004.8 | -14004.8
MARS | 45.6 | 43.7 | 39.52 | 41.42 | 456 | 12524.8 | 2475.2
JUPITER | 316.8 | 303.6 | 274.56 | 287.76 | 3168 | 87014.4 | -72014
SATURN | 138 | 132.25 | 119.6 | 125.35 | 1380 | 37904 | -2290
URANUS | 138 | 132.25 | 117 | | 1380 | 37904 | -2290
NEPTUNE | 134.4 | 128.8 | 116. | | 1344 | 36915.2 | -21915
PLUTO | 4.8 | 4.6 | 4. | | 48 | 1318.4 | 13681

FUEL" until they get a zero (0) under "REMAINING FUEL" by Neptune.

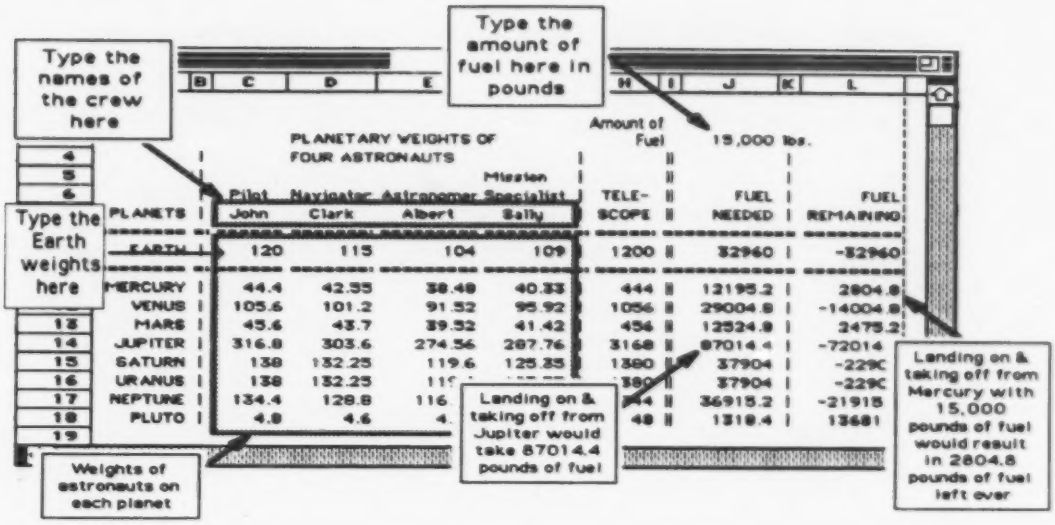
7. Hand out copies of the **Astronomy Mission Activity** to the class. If there are a limited number of computers in the classroom, then have students come to the computer(s) in groups of two to work on the problems as the rest of the class works on another activity. If there is a computer lab, then have the class work on the activity problems in the lab.

Measure

Given a prepared spreadsheet on the relative gravity of each planet, have each student decide which planets could be visited with three friends (weighing ?, ?, and ? pounds on Earth) and a telescope based on fuel amounts of 11,000 lbs., 23.500 lbs, and 18,970 lbs.

BEST COPY AVAILABLE

Astronomy Mission Spreadsheet Illustration


Type the names of the crew here
Type the amount of fuel here in pounds
Type the Earth weights here
PLANETARY WEIGHTS OF FOUR ASTRONAUTS
Mission Specialist
Amount of Fuel
15,000 lbs.
PLANETS
Pilot John
Navigator Clark
Astronomer Albert
Specialist Sally
TELE-SCOPE
FUEL NEEDED
FUEL REMAINING
EARTH 120 115 104 109 1200 32960 -32960
MERCURY 44.4 42.55 38.48 40.33 444 12195.2 2804.8
VENUS 105.6 101.2 91.52 95.92 1056 29004.8 -14004.8
MARS 45.6 43.7 39.52 41.42 456 12524.8 2475.2
JUPITER 316.8 303.6 274.56 287.76 3168 87014.4 -72014
SATURN 138 132.25 119.6 125.35 1380 37904 -229C
URANUS 138 132.25 37904 -229C
NEPTUNE 134.4 128.8 36915.2 -21915
PLUTO 4.8 4.6 48 1318.4 13681
Weights of astronauts on each planet
Landing on & taking off from Jupiter would take 87014.4 pounds of fuel
Landing on & taking off from Mercury with 15,000 pounds of fuel would result in 2804.8 pounds of fuel left over

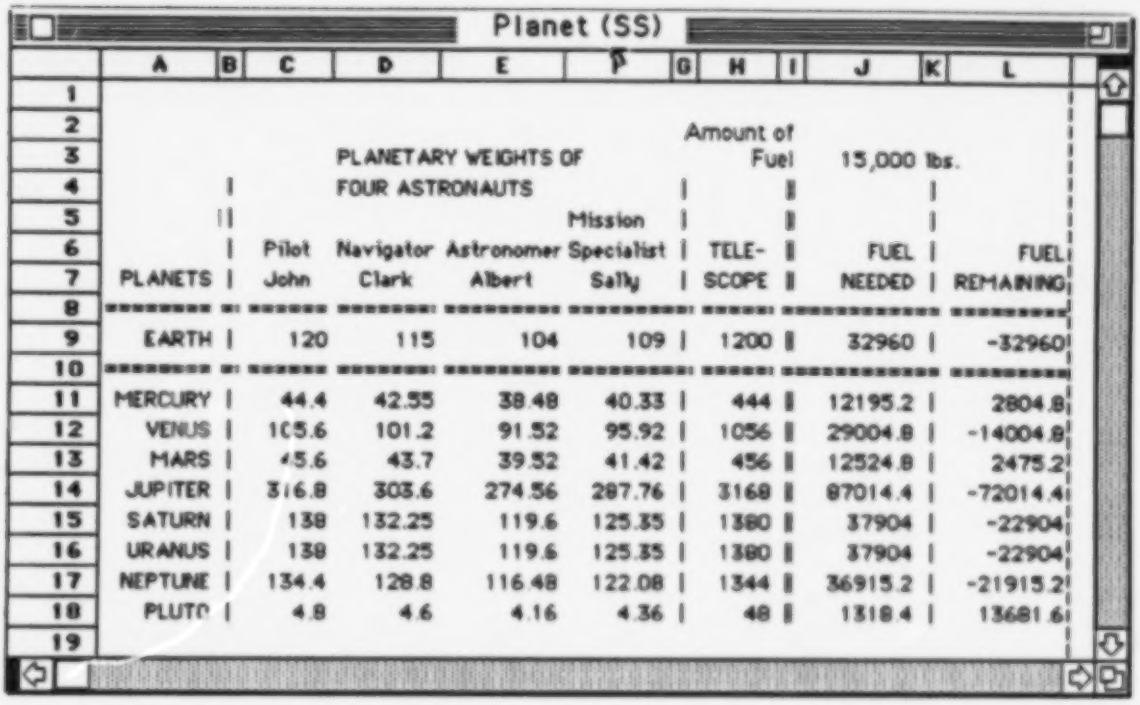
BEST COPY AVAILABLE

Astronomy Mission Spreadsheet
Example #1

Planets (SS)

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2								Amount of				
3				PLANETARY WEIGHTS OF				Fuel		32,000 lbs.		
4				FOUR ASTRONAUTS								
5						Mission						
6			Pilot	Navigator	Astronomer	Specialist		TELE-		FUEL		FUEL
7	PLANETS		John	Clark	Albert	Sally		SCOPE		NEEDED		REMAINING
8												
9	EARTH		120	115	104	109		1200		32960		-960
10												
11	MERCURY		44.4	42.55	38.48	40.33		444		12195.2		19804.8
12	VENUS		105.6	101.2	91.52	95.92		1056		29004.8		2995.2
13	MARS		45.6	43.7	39.52	41.42		456		12524.8		19475.2
14	JUPITER		316.8	303.6	274.56	287.76		3168		87014.4		-55014.4
15	SATURN		138	132.25	119.6	125.35		1380		37904		-5904
16	URANUS		138	132.25	119.6	125.35		1380		37904		-5904
17	NEPTUNE		134.4	128.8	116.48	122.08		1344		36915.2		-4915.2
18	PLUTO		4.8	4.6	4.16	4.36		48		1318.4		30681.6
19												

Astronomy Mission Spreadsheet
Example #2



Planet (SS)

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2								Amount of				
3				PLANETARY WEIGHTS OF				Fuel		15,000 lbs.		
4				FOUR ASTRONAUTS								
5						Mission						
6			Pilot	Navigator	Astronomer	Specialist		TELE-		FUEL		FUEL
7	PLANETS		John	Clark	Albert	Sally		SCOPE		NEEDED		REMAINING
8												
9	EARTH		120	115	104	109		1200		32960		-32960
10												
11	MERCURY		44.4	42.55	38.48	40.33		444		12195.2		2804.8
12	VENUS		105.6	101.2	91.52	95.92		1056		29004.8		-14004.8
13	MARS		45.6	43.7	39.52	41.42		456		12524.8		2475.2
14	JUPITER		316.8	303.6	274.56	287.76		3168		87014.4		-72014.4
15	SATURN		138	132.25	119.6	125.35		1380		37904		-22904
16	URANUS		138	132.25	119.6	125.35		1380		37904		-22904
17	NEPTUNE		134.4	128.8	116.48	122.08		1344		36915.2		-21915.2
18	PLUTO		4.8	4.6	4.16	4.36		48		1318.4		13681.6
19												

Astronomy Mission Activity

Name _____

Use the *Planets* spreadsheet file and pretend that you are piloting a planetary shuttle carrying three of your friends as crew members and a 1200 pound telescope. Your task is to leave the Earth, land on one of the planets of the solar system, use the telescope to examine the galaxy, take off from the planet, and return to Earth. Use the computer spreadsheet to solve the following problems with the weights of your crew members (classmates).

1. How many of the planets could you visit with 18,000 pounds of fuel?

   Explain how you got the answer:

2. Which planets would you be able to visit with only 10,000 pounds of fuel?

3. Which planets would you be able to visit with 25,000 pounds of fuel?

4. How much fuel would it take to visit Mars?

5. How much fuel would it take to visit Jupiter?

6. Which planet would take the largest amount of fuel to visit?

7. Describe another way that a computer spreadsheet might be used to solve a space exploration problem.

ISSUES
SKILLS
APPLICATION

Computer Skills Curriculum

8

Title: SOS: Save Our Shrimp Industry
Grade: 8
Competency 3.2: Enter and edit data into a prepared spreadsheet to test "What if?" statements.
Measure 3.2.1: Given a prepared spreadsheet on the income from shrimping in North Carolina, test "What if" scenarios by entering possible amounts of pollutants dumped into the water, and observing the resulting effects on shrimp harvests.

Objectives Addressed by This Lesson

Communication Skills

2.1 The learner will identify, collect, or select information and ideas.

2.3 The learner will apply, extend, and expand on information and concepts.

4.1 The learner will respond to personal situations and events in selections and to personal situations and events.

Mathematics : (Gr. 8)

1.1 Explore the real number system by describing and using various forms of numbers in realistic situations.

1.2 Use appropriate estimation techniques in meaningful situations; justify the technique.

5.1 Use an organized approach and a variety of strategies to solve increasingly complex non-routine problems.

5.2 Use calculators and computers in problem solving situations as appropriate.

5.4 Investigate open-ended problems, formulate questions, and extend problem solving situations.

Social Studies: (Gr. 8)

1.3 Analyze ways North Carolinians have modified, used, and adapted to the physical environment.

11.2 Evaluate the importance of technological innovations and advances on quality of life in North Carolina and the nation.

Materials Needed: Transparencies of **Shrimp Spreadsheet** and **Shrimp Spreadsheet Explanation** blackline masters; overhead projector; computer with the *SHRIMP* spreadsheet file (one for the class or one for each group).

Time: Two class sessions.

TERMS
Columns
Rows
Cells
Labels
Values
Formulas

Activities

Pre-Activities:

1. Divide the class into groups of four or five students. Ask each group to think of and record three possible effects that water pollution might have on shrimping in North Carolina. Some possible answers are:
   - Some shrimping companies might go out of business.
   - If there are no other jobs, out-of-work shrimpers would start collecting welfare.
   - Out-of-business shrimp companies would not pay taxes.
   - Loss of local taxes would mean a cut-back in local services for schools, parks, roads, police, etc.
   - With shrimpers out of work, other businesses would lose income.
2. Have a member of each group report to the class their responses.
3. Have each group think of and record three reasons why industries along a river would dump wastes into the river. Some possible answers are:
   - It would cost money to buy land for a landfill.
   - It would cost money to purchase and install equipment to process the waste.
   - The money it would cost to deal with the waste would cut into profits.
   - A loss of profits might cause the stock-holders to vote for firing the plant manager.
   - The money it would cost to deal with the waste might cause the company to increase the price of their products, causing a loss in sales.
   - The cost of dealing with the waste might cause the plant to have to layoff workers.
4. Have a member of each group report to the class their responses.
5. Discuss with the class how the North Carolina shrimping industry might have the grounds to sue plants up river that are polluting the shrimping waters and how they might determine the amount of the law suits.
6. Ask each group to come up with alternatives to suing polluting industries and report them to the rest of the class.
7. Discuss with the class the alternative that polluting industries might purchase and install waste processing machinery rather than pay the shrimpers directly through a law suit.
8. Ask each group to talk about how a computer spreadsheet might be used to determine the effects on shrimping of installing waste processing machinery up river and how it might be used to convince shrimpers that this would be a better alternative than suing.

SPREADSHEETS

Science: (Gr. 8)

5.3 Demonstrate knowledge of the conservation of matter.

5.5 Investigate how human activities affect ecosystems.

5.10 Demonstrate that people interact with the environment and produce change.

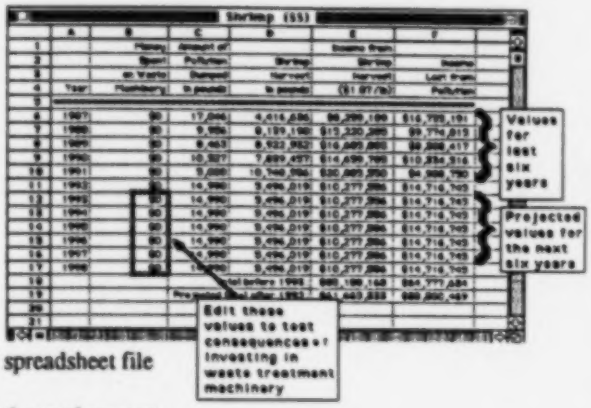
Computer Skills: (Gr. 8)

3.2 Enter and edit data into a prepared spreadsheet to test "What if?" statements.

Notes:

Activity:

1. Display a transparency of the **Shrimping Spreadsheet** blackline master. Ask the students to identify the information provided by the spreadsheet. (Year, Money spent on waste machinery, Amount of pollution dumped, etc.)
2. Ask each group to determine from the picture of the spreadsheet, how much the shrimping industry my sue the polluting industries for damages for a particular year? Years?. Have a member of each group report their responses.
3. Display a transparency of the **Shrimping Spreadsheet Explanation** blackline master for the class.
   Explain that students can edit the cells for *Money Spent on Waste Machinery* from 1993 on and that the spreadsheet will automatically project the incomes for the remaining years and lost income based on their edits.


Values for last six years
Projected values for the next six years
Edit these values to test consequences of investing in waste treatment machinery

4. Arrange for each group to have access to a computer with the prepared spreadsheet file **SHRIMP** loaded.
5. Have each group determine the total amount that would have to be spent by polluting industries to completely stop pollution ($67,455,000). Also have each group determine the increase in income for shrimpers ($88,298,595).
6. Ask each group to report on the increased incomes to shrimpers if the polluting industries invested 25% of the full amount each year for four years, or 50% per year for two years.

Extended Activity:

Have each group prepare a case for convincing the shrimping industry and polluting companies to have polluting companies invest in waste processing machinery rather than the shrimp industry suing the polluting companies. Have each group deliver their case to the class using a variety of media (charts, graphs, video, etc.)

Measure

Given a prepared spreadsheet on the income from shrimping in North Carolina, students will solve "What if" problems by editing money spent to eliminate pollution.

BEST COPY AVAILABLE

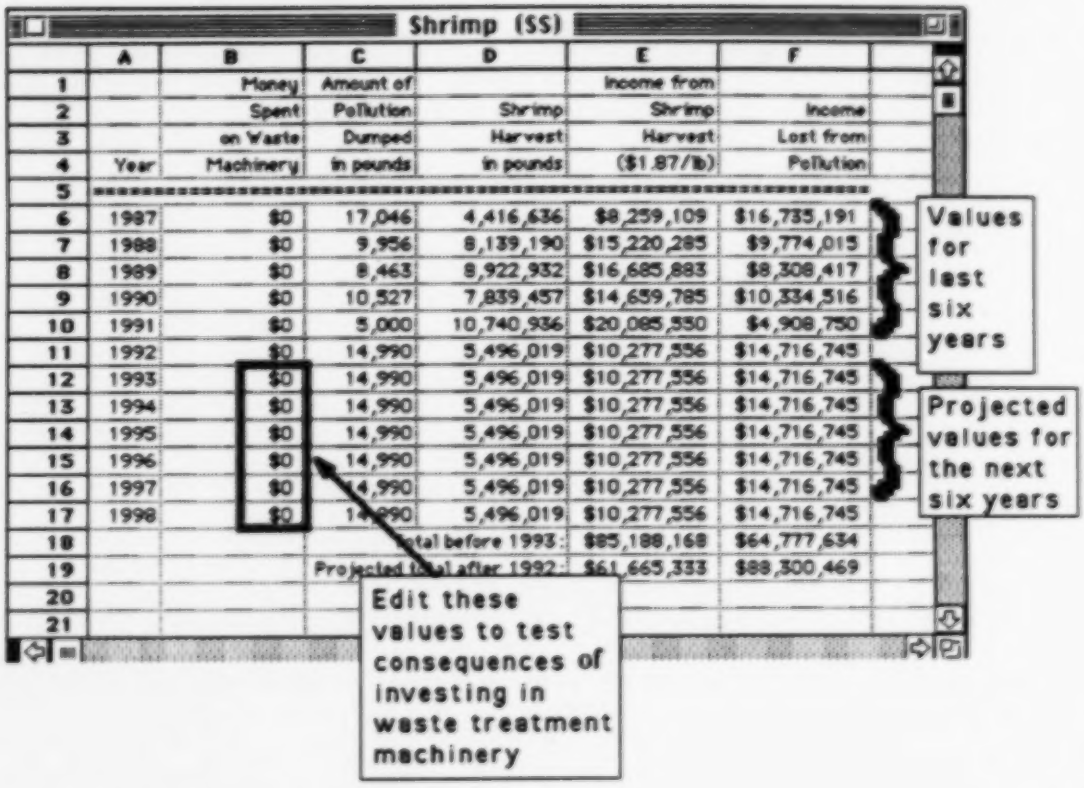
Shrimp Spreadsheet

Shrimp (SS)

	A	B	C	D	E	F
1		Money	Amount of		Income from	
2		Spent	Pollution	Shrimp	Shrimp	Income
3		on Waste	Dumped	Harvest	Harvest	Lost from
4	Year	Machinery	in pounds	in pounds	($1.87/lb)	Pollution
5	==========	==========	==========	==========	==========	==========
6	1987	$0	17,046	4,416,636	$8,259,109	$16,735,191
7	1988	$0	9,956	8,139,190	$15,220,285	$9,774,015
8	1989	$0	8,463	8,922,932	$16,685,883	$8,308,417
9	1990	$0	10,527	7,839,457	$14,659,785	$10,334,516
10	1991	$0	5,000	10,740,936	$20,085,550	$4,908,750
11	1992	$0	14,990	5,496,019	$10,277,556	$14,716,745
12	1993	$0	14,990	5,496,019	$10,277,556	$14,716,745
13	1994	$0	14,990	5,496,019	$10,277,556	$14,716,745
14	1995	$0	14,990	5,496,019	$10,277,556	$14,716,745
15	1996	$0	14,990	5,496,019	$10,277,556	$14,716,745
16	1997	$0	14,990	5,496,019	$10,277,556	$14,716,745
17	1998	$0	14,990	5,496,019	$10,277,556	$14,716,745
18			Total before 1993:		$85,188,168	$64,777,634
19			Projected total after 1992:		$61,665,333	$88,300,469
20						
21						

BEST COPY AVAILABLE

Shrimp Spreadsheet Explanation


Shrimp (SS)
Values for last six years
Projected values for the next six years
Edit these values to test consequences of investing in waste treatment machinery

	A	B	C	D	E	F
1		Money	Amount of		Income from	
2		Spent	Pollution	Shrimp	Shrimp	Income
3		on Waste	Dumped	Harvest	Harvest	Lost from
4	Year	Machinery	in pounds	in pounds	($1.87/lb)	Pollution
5						
6	1987	$0	17,046	4,416,636	$8,259,109	$16,735,191
7	1988	$0	9,956	8,139,190	$15,220,285	$9,774,015
8	1989	$0	8,463	8,922,932	$16,685,883	$8,308,417
9	1990	$0	10,527	7,839,457	$14,659,785	$10,334,516
10	1991	$0	5,000	10,740,936	$20,085,550	$4,908,750
11	1992	$0	14,990	5,496,019	$10,277,556	$14,716,745
12	1993	$0	14,990	5,496,019	$10,277,556	$14,716,745
13	1994	$0	14,990	5,496,019	$10,277,556	$14,716,745
14	1995	$0	14,990	5,496,019	$10,277,556	$14,716,745
15	1996	$0	14,990	5,496,019	$10,277,556	$14,716,745
16	1997	$0	14,990	5,496,019	$10,277,556	$14,716,745
17	1998	$0	14,990	5,496,019	$10,277,556	$14,716,745
18				Total before 1993:	$85,188,168	$64,777,634
19				Projected total after 1992:	$61,665,333	$88,300,469
20						
21						

Spreadsheet, Gr. 6-8

cell: The intersection of a row and a column on a spreadsheet in which data can be entered. Cells are designated by their column letter and row number -- B4.

column: The vertical divisions of a spreadsheet that intersect the horizontal divisions (rows) to form cells in which data can be entered. columns are labeled alphabetically (A,B,C,...AB,AC,AD...).

formula: A type of information that can be entered into a spreadsheet cell. It is a mathematical equation consisting of numbers, other cell designators, and symbols for mathematical operations. the result of the formula is displayed in the cell that holds the formula.

label: A type of data that can be entered into a spreadsheet cell. It consists of words that usually label a column or row of numbers.

row: The horizontal divisions of a spreadsheet that intersect the vertical divisions (columns) to form cells in which data can be entered. Rows are labeled numerically (1,2,3,4,...).

spreadsheet: An applications program, used in financial forecasting, that can quickly handle calculations and perform evaluation.

value: One type of data that can be entered into a spreadsheet cell. It consists of numbers that can be added, subtracted, etc.

Primary source of definitions: Understanding Computers Through Applications (Student's Book and Teacher's Guide); Glencoe, Macmillan/McGraw-Hill.